and others are taken. Using the PC program ORIENT,[2] the orientation data are compared and adjusted in order to obtain the best statistical fit for a set of data, thus defining a structural domain. A structural domain defines an area of order which is separated from another by a major tectonic feature such as a fault. In this way the positions of major faults can be defined without actually observing them.

At this stage an accurate geological map of the area is made, integrating the field geological mapping with the geophysical investigations and regional drilling for geological information.

Correlation with oceanographic data

Seaward extrapolation of the geological data is then attempted using the orientation of the structural domains, the aeromagnetic trends, bathymetry, side scan sonar and the deep-sea reflection seismic surveys. This interpretation is assisted by available deep-sea sampling.

Seismicity

As stated above, one of the criteria defining a 'capable fault' is the existence of instrumentally determined micro-seismicity along it structural trend defined by direct observation, definition of structural domains or geophysical interpretations (aeromagnetics). Unfortunately, the seismic history of the coastal areas of South Africa is incomplete owing to both the sparse population of certain areas and the lack of seismic instrumentation. This dilemma has partially been remedied by an archival search into historic seismicity and by the establishment of triaxial seismic stations in some of the areas of interest. Should the micro-seismic activity cluster along any recognizable structural trend, this will be avoided. The seismological history of the area, however, can unfortunately be obtained only from long-term monitoring.

Dating of last movement on a fault

In California, actual ground movements, such as the splitting of a tarred road or the displacement of citrus trees in an orchard, are commonplace occurrences which are not observed in South Africa. The first direct observation of Quaternary rejuvenation of an older fault was made by Hill[3] in the southern Cape. This has been followed by observations made by Andreoli *et al.*,[4] in the southern Cape and by von Veh *et al.*[5] in Natal, where faults readily visible on aeromagnetic and satellite imagery are also seen to transect consolidated Late Pleistocene formations. Another method used in South Africa to date events of faulting is the levelling off of the faulted blocks by higher stands of sea-level, indicating that the faulting is older than that particular marine transgression.

Summary

When assessing a potential nuclear site from a structural geological point of view, the most important factors are the presence of 'capable faults', the seismicity of the area, and the existence of good foundation rock. Since the sites are all bound to the coastal areas, extrapolation of the geology under the sand cover as well as out to sea is achieved by the use of aeromagnetic surveys, structural domain analysis as well as detailed geological mapping and drilling. All faults that are located directly by geological mapping, indirectly by geophysical surveying or inferred by structural domain analysis, must be assessed as to whether they are capable or not. Site-related micro-seismicity is monitored in order to ascertain if any seismic trends exist or if any faults show activity.

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Did the last blue antelope *Hippotragus leucophaeus* die in the eastern Orange Free State, South Africa?

B.D. Colahan

Smithers[1] gives the range of the extinct blue antelope (bloubok, or blaauwbok), *Hippotragus leucophaeus,* in the early 18th century as being confined to a triangle of country bounded by Caledon–Swellendam and Bredasdorp, in the southern Cape Province. There has in the past been some uncertainty over the northern limits of the historical range of this antelope, because of its confusion among early naturalists with one of its congeners, the roan (bastergemsbok), *H. equinus;* e.g. E. Layard, then director/curator of the South African Museum, wrote:[2] 'The blaauwbok lives in herds of six to twelve on the slopes and summits of small hills. They are most abundant north of Karrichane [= Kaditshwêne, north of Zeerust in the western Transvaal].' However, I have submitted elsewhere[3] that there is good evidence in a recently published diary[4] that the historical range of the blue antelope extended at least 1000 km northeast of the limits given by Smithers,[1] into the eastern Orange Free State, where it was misidentified as roan. Furthermore, it occurred there more than fifty years after the last documented sighting in the southern Cape, of around 1800.[1]

In an entry in the Bloemfontein diary of Lieut. W.J. St John,[4] this Royal Artillery subaltern writes of having hunted 'bastard gemsbok' in the eastern Orange River Sovereignty (now the Orange Free State), on 28 July 1853. This was apparently at 'Liebenberg's Vley', which was probably in the vicinity of the present farm Liebenbergsvlei 148, at 28°15'S, 28°29'E, in what is now the Bethlehem District:

> Returning to a [= the?] camp and close to it we found a troop of about ten or twelve bastard gemsbok, noblest of the antelope tribe that I have yet seen. The bulls stand 15 hands high. They are a bluish grey colour and carry long scimitar-shaped horns curving gracefully back on their shoulders. I gave chase and fired into the herd, and my after-rider says I hit one. However, it was too late to follow up the herd.

St John presently managed to shoot a young male that his dogs had cornered in a pool, and saw six more of the antelope the next morning, but did not pursue them.

I have argued[3] that, although St John

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used a direct translation of the Afrikaans colloquial name for roan, the description he gives, apart from the large size, is more appropriate for the blue antelope (see Smithers,[1] or Van Bruggen[5]). St John apparently saw the animals in a vlei area, where the grass was probably long enough to obscure at least their legs; I submitted that in attempting to compensate for this, he overestimated their height. Furthermore, the habitat in the area he was hunting during the two days that he saw them appears to have been mainly open grassland, because he writes of riding 'through a desolate black wilderness of burnt grass', and also of seeing 'an enormous number of wildebeest [= black wildebeest *Connochaetes gnou]*', a species of the open plains, earlier that afternoon; and the next morning, of riding through country 'packed with blesboks (*sic*) [*Damaliscus dorcas phillipsi*]', another grassland species. Smithers[1] describes the habitat requirements of roan as 'critical, their occurrence confined to lightly wooded savanna with extensive open areas of medium to tall grasses, where water is available'. St John probably obtained his identification from local farmers who were more likely to have been familiar with the then, in the Transvaal, fairly widespread roan,[1,6] with which they confused it.

On the above evidence, I proposed[3] that St John's 'bastard gemsbok' were part of an isolated, remnant population of the blue antelope that arose in the course of the decline of this species in South Africa, which appears to have begun long before the first Europeans set foot in this region,[4] and that the last blue antelope died not in the southern Cape around the end of the 18th century, but in the eastern Orange Free State more than fifty years later.

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The Hedgehog & the Fox

Perfectionists

The father was telling me about his son.

'A crumb drops onto the floor, he can't stand it. He's got to pick it up right away.

'The other day, it's raining. Drops are coming from under the gutter, falling onto the paving. It's too terrible. He phones the builder, he phones the plumber, he's got to have it fixed, his gutter can't leak.

'Three times he's made his fishpond. It was beautiful, but it wasn't beautiful enough for him, so the builder must dig it up and do it again. Still it wasn't perfect, now it's the third time. He sits, he looks, he feeds the fish, I just wait for him to tell the builder, still it's no good.

'Before this accident happened to him, I used to visit him, sit in the chair, smoke my cigarettes, drop sometimes a little ash on the floor, it was fine. He cleaned, he didn't clean, it was okay, we relaxed. Today if I move a book on his desk, if I pick up a cup from here and put it down there, he goes mad.

'Please God he doesn't get a scratch on his car. It will be the end of the world.'

* * *

In 1942, Kurt Goldstein, a pioneer in head injury rehabilitation, published a book called *After Effects of Brain Injuries in War*. I read the book in the 1960s, when I was an undergraduate psychology student at Tel Aviv University, and one passage imprinted itself on my mind. Goldstein talks about the behaviour of his brain-injured veterans of the First World War in a rehabilitation hospital. If an unfortunate orderly was thoughtless enough to rearrange a man's socks in his drawer, or to lay out his underwear differently on the shelf, there would be a desperately violent reaction, recriminations, accusations, a hue and cry as if the world were indeed coming to an end. Goldstein found a name for this phenomenon that has entered the vocabulary of modern neuropsychology, 'the catastrophic reaction': An individual faced by an unforeseen change or a sudden deviation from a well-known routine is so deeply threatened that the autonomic responses of fear and shock set in.

* * *

We reflected together — the father, the son, who had been unconscious after a motor accident, and I — on the meaning of this World War I anecdote.

'Why this perfectionism?' asked the father helplessly. 'Why is this nonsense so important to him all of a sudden, now?'

I told them another story, about my late father, who in his own way was as much a perfectionist as the son.

He was a man of violent temper, who would flash out, eyes blazing and almost unable to speak for the rush of words, at me, my sister, the domestics, everyone in the family but never my mother. Heaven help the person who opened his morning newspaper before it reached him: If the folds were not fresh and knife-sharp, his morning reading pleasure was lost. Heaven help the person who interfered (as he put it) with his papers, piled high on the sideboard or on his desk, or the unfortunate who replaced a borrowed item an inch away from where it had been taken.

But underneath this perfectionism was chaos. The family dutifully preserved the fiction that he could lay his hands in an instant on any document in the rat's nest of papers on the desk, but the truth was different: It would take him days to find an invoice or a letter, though he maintained he knew exactly where he had put it.

* * *

Perfectionism is the mask worn by chaos. When the filing baskets inside our heads get muddled — for which brain damage is by no means a prerequisite! — so that it is never clear where a thought should be filed, or from which basket it can be retrieved, perfectionism steps in to shield us from inner disorder. Sometimes this confusion is natural, or develops in the course of a lifespan; sometimes it is precipitated by a brain injury.

The essence of the personality change following brain injury is the person's uncertainty and confusion, the sense, in Muriel Lezak's words, that a clock somewhere inside the head has struck thirteen. The maintenance of a rigid orderliness, whether in the sock drawer, the diary, or in the precise placement of an ornament on a table, gives for a while the illusion of control over an environment that is obstinately unpredictable and therefore deeply threatening.

* * *

The most notable and prominent perfectionists on the human stage are now, and have always been, the emperors, kings, presidents and prime ministers, presiding over precisely ordered documents in magnificent binders and ceremonial guards of honour in which every tiny detail of Ruritarian uniform is precisely in place.

I wonder why? Whose chaos is it they fear?

Leopold Samuelson